

Perioperative do-not-resuscitate orders

Trainee experiential learning in preserving patient autonomy and knowledge of professional guidelines

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Abstract

Anesthesiologists and surgeons have demonstrated a lack of familiarity with professional guidelines when providing care for surgical patients with a do-not-resuscitate (DNR) order. This substantially infringes on patient's self-autonomy; therefore, leading to substandard care particularly for palliative surgical procedures. The interventional nature of surgical procedures may create a different mentality of surgical "buy-in," that may unintentionally prioritize survivability over maintaining patient self-autonomy. While previous literature has demonstrated gains in communication skills with simulation training, no specific educational curriculum has been proposed to specifically address perioperative code status discussions. We designed a simulated standardized patient actor (SPA) encounter at the beginning of post-graduate year (PGY) 2, corresponding to the initiation of anesthesiology specific training, allowing residents to focus on the perioperative discussion in relation to the SPA's DNR order.

Forty four anesthesiology residents volunteered to participate in the study. PGY-2 group (n = 17) completed an immediate post-intervention assessment, while PGY-3 group (n = 13) completed the assessment approximately 1 year after the educational initiative to ascertain retention. PGY-4 residents (n = 14) did not undergo any specific educational intervention on the topic, but were given the same assessment. The assessment consisted of an anonymized survey that examined familiarity with professional guidelines and hospital policies in relation to perioperative DNR orders. Subsequently, survey responses were compared between classes.

Study participants that had not participated in the educational intervention reported a lack of prior formalized instruction on caring for intraoperative DNR patients. Second and third year residents outperformed senior residents in being aware of the professional guidelines that detail perioperative code status decision-making (47%, 62% vs 21%, $P = .004$). PGY-3 residents outperformed PGY-4 residents in correctly identifying a commonly held misconception that institutional policies allow for automatic perioperative DNR suspensions (85% vs 43%; $P = .02$). Residents from the PGY-3 class, who were 1 year removed the educational intervention while gaining 1 additional year of clinical anesthesiology training, consistently outperformed more senior residents who never received the intervention.

Our training model for code-status training with anesthesiology residents showed significant gains. The best results were achieved when combining clinical experience with focused educational training.

Abbreviations: DNR = do-not-resuscitate, PGY = post-graduate year, SPA = standardized patient actor.

Keywords: communication training, do-not-resuscitate, perioperative code status, simulation

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All data generated or analyzed during this study are included in this published article [and its supplementary information files].

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1. Introduction

Despite consensus statements from professional societies, patients with DNR orders are routinely mismanaged at the time of surgery. Survey studies demonstrate that physicians of all training levels often do not comply with professional guidelines as they relate to DNR orders, demonstrate discomfort initiating end of life discussions, and have a lack of training in this basic concept of self autonomy.^[1-4] Despite the Accreditation Council for Graduate Medical Education identifying communication skills as a core competency, serious training gaps remain for residents and fellows.^[5] Specifically for anesthesiology residents, the intraoperative goals of care for patients with a DNR order may fundamentally conflict with their principal emphasis that emphasizes resuscitative techniques aimed to minimize morbidity and mortality.^[6] Additionally, an anesthesiologist's lack of prior relationship with a majority of their patients and a deferential attitude aimed at avoiding "rocking the boat" for a planned surgical procedure may further limit their ability to effectively advocate on behalf of their patients.^[7] These barriers may lead to suboptimal care for patients with DNR orders seeking surgical procedures.

Perioperative decision-making must balance the likelihood of a positive surgical intervention in relation to a patient's goals of care and perceptions of quality of life. A significant percentage of patients undergoing surgical procedures, up to 15%, present with advanced directives that include a do-not-resuscitate order (DNR).^[8] A significant portion of these patients may be undergoing palliative procedures where the typical goals of care may not always apply. However, perioperative medical providers often set implicit expectations, described as “buy-in,” to pursue aggressive life support interventions postoperatively for patients that choose to pursue a surgical intervention.^[9] While emergent surgical procedures consistently place a strain on all aspects of optimal medical care, for non-emergent surgical procedures, a discussion balancing a patient's DNR wishes with the inherent risks of the perioperative environment is ideally addressed well before the day of surgery. Unfortunately, preoperative surgical consultation often does not include an analysis of advanced directives even in high-risk surgical procedures.^[10] Omitting the review of advanced directives and clarification of the patient's wishes for DNR orders from the pre-surgical clinic visit unnecessarily defers the need to consider this issue to the preoperative period immediately prior to the patient entering the surgical suite. Previous research, mostly within internal medicine and critical care, has established that focused resident training in the management of patient code status discussions has demonstrated long-term improvements and these gains have been predictive of clinical performance.^[11–13] The perioperative setting poses a relatively unique challenge of a temporary but inescapable loss of patient autonomy. This places a premium on training providers to engage in detailed and forward looking discussions with patients prior to undergoing surgical procedures. Surgical patients seeking palliative procedures or those presenting with advanced directives that limit the scope of “resuscitation” must undergo a collaborative review of their wishes to determine the plan for their perioperative course. In addition to individual hospital policies that may provide a guide for this dialogue, the American Society of Anesthesiologists (ASA) and American College of Surgeons (ACS) provide a

guideline statements that details the approach for caring for such patients known as “required reconsideration” and mandates that an automatic suspension of DNR orders is not appropriate.^[14,15]

Considering the educational barriers and professional dogmas that anesthesiologists experience in managing patients with DNR orders, we designed a simulated standardized patient encounter for residents to complete during the first month of their anesthesiology specific training in their postgraduate 2nd year (PGY-2). This exercise aimed to improve clinical knowledge when caring for such patients. Subsequently, we attempted to evaluate the efficacy and retention of the didactic training by assessing knowledge of professional guidelines and hospital policies regarding patients with perioperative DNR orders.

2. Materials and methods

This study was completed following ethical review and approval by the Institutional Board Review (#2017E0432). Two successive anesthesiology resident classes in their first month of their PGY-2 year completed a standard training session as 1 part of their educational curriculum designed to prepare them for the expansion of clinical responsibilities in the operating room. This session was a 1 hour long simulated encounter with a (SPA). Participants were told that the aim of the exercise was to discuss the DNR status of the patient who was about to undergo a carotid endarterectomy secondary to high-grade carotid stenosis. Participants interacted with the SPA, who was dressed in a hospital gown, as they tried to address the patient's DNR order. The SPA was not provided with a script on how to answer questions, instead maintained an emphasis on portraying a patient with poor understanding of her DNR order, and simply insisted that she did not want “to live on tubes and machines.” Participants were not instructed on how to navigate this conversation prior to completing the exercise. Immediately following the simulated conversation there was a standardized 1-hour group debriefing aimed to address professional guidelines and hospital policies related to the topic.

A study overview including a timeline for the educational intervention and subsequent assessments is presented in Figure 1.

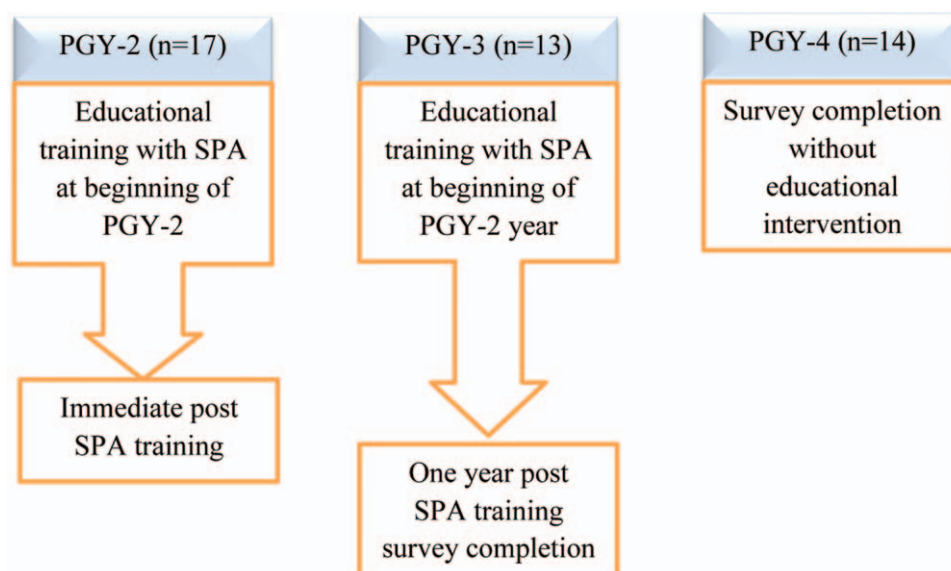


Figure 1. Timeline of study design. PGY = post graduate year, SPA = Standardized Patient Actor.

Completion of the survey was voluntary and anonymized to all variables other than level of training in order to ensure anonymity. Following Institutional Review Board approval, a 12 question survey was distributed to all PGY 2, 3, and 4 anesthesiology residents. Since no other validated metric is available in the literature for this specific situation, our survey tool was designed based on consensus agreement of pertinent expertise trainees should have when caring for these patients. PGY-2 residents completed the survey immediately subsequent to

their training session with the SPA, while the PGY-3 group completed the survey approximately 1 year following their training. PGY-4 residents did not undergo the educational session at the beginning of their PGY-2 year, but were asked to complete the same survey questions. The survey examined any previous training and experiences related to code status discussions, as well as awareness of ASA guidelines and institutional policies on the topic (Table 1). The aim was to pinpoint the effectiveness of the educational exercise and establish the level of retention 1 year

Table 1
DNR Survey Summary by Class. PGY=post graduate year.

Variable	Level	PGY-2 (n=17)	PGY-3 (n=13)	PGY-4 (n=14)	P value
I have previously received helpful training/education focused on management of patients with perioperative DNR orders.	Agree	1 (6%)	8 (62%)	2 (14%)	.003
	Neutral	3 (18%)	2 (15%)	1 (7%)	
	Disagree	13 (76%)	3 (23%)	11 (79%)	
In my experience, there is always good coordination and communication between the surgical and anesthesia team in developing a care plan for a patient with a DNR status coming for surgery.	Agree	0 (0%)	0 (0%)	2 (14%)	.029
	Neutral	6 (35%)	4 (31%)	0 (0%)	
	Disagree	11 (65%)	9 (69%)	12 (86%)	
For patients with DNR orders in place preoperatively, only members of the surgical team (as opposed to anesthesia team) are required to discuss the perioperative code status with the patient.	Agree	2 (12%)	4 (31%)	3 (21%)	.301
	Neutral	0 (0%)	1 (8%)	2 (14%)	
	Disagree	15 (88%)	8 (62%)	9 (64%)	
The American Society of Anesthesiology does NOT have guidelines for management of patients with an active DNR order coming to the operating room?	Agree	0 (0%)	3 (23%)	7 (50%)	.004
	Neutral	9 (53%)	2 (15%)	4 (29%)	
	Disagree	8 (47%)	8 (62%)	3 (21%)	
The principal of self-determination gives the patient the right to insist on NOT undergoing intubation during a surgical procedures.	Agree	8 (47%)	11 (85%)	2 (14%)	.004
	Neutral	6 (35%)	1 (8%)	5 (36%)	
	Disagree	3 (18%)	1 (8%)	7 (50%)	
It can be appropriate for a patient to nominate the anesthesiologist to decide if resuscitation should proceed during the course of the operative procedure.	Agree	9 (53%)	8 (62%)	3 (21%)	.050
	Neutral	4 (24%)	2 (15%)	1 (7%)	
	Disagree	4 (24%)	3 (23%)	10 (71%)	
It may be appropriate to reinstate a patient's DNR order during the course of the surgical procedure/ anesthetic if the underlying cause of the cardiovascular arrest is obviously related to the patient's underlying pathology.	Agree	6 (35%)	4 (31%)	3 (21%)	.951
	Neutral	5 (29%)	4 (31%)	4 (29%)	
	Disagree	6 (35%)	5 (38%)	7 (50%)	
I am aware of our institutional policies on management of patients with DNR status coming to the operating room.	Agree	0 (0%)	9 (69%)	2 (14%)	<.001
	Neutral	2 (12%)	1 (8%)	4 (29%)	
	Disagree	15 (88%)	3 (23%)	8 (57%)	
Hospital policy allows for automatic suspension of a preoperative DNR order once a patient enters the operating room and remains in place for 24 hours after completion of the surgical procedure.	Agree	1 (6%)	0 (0%)	6 (43%)	.029
	Neutral	4 (24%)	2 (15%)	2 (14%)	
	Disagree	12 (71%)	11 (85%)	6 (43%)	
I am aware of the proper pathway for documentation DNR orders and suspensions in our electronic medical.	Agree	1 (6%)	8 (62%)	3 (21%)	.006
	Neutral	3 (18%)	0 (0%)	4 (29%)	
	Disagree	13 (76%)	5 (38%)	7 (50%)	
Survival of intraoperative cardiac arrests is as likely as other in-hospital (outside of the operating room) arrests.	Agree	4 (24%)	2 (15%)	1 (7%)	.125
	Neutral	5 (29%)	0 (0%)	2 (14%)	
	Disagree	8 (47%)	11 (85%)	11 (79%)	
The percentage of patients that come to the preoperative area with DNR orders in place is less than 5%.	Agree	10 (59%)	4 (31%)	3 (21%)	.145
	Neutral	4 (24%)	2 (15%)	4 (29%)	
	Disagree	3 (18%)	7 (54%)	7 (50%)	

after completing the exercise. Survey questions were scored on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). A faculty member with experience in simulation education reviewed the survey for clarity, content, and completeness. In order to test for differences in responses for each question between the 3 postgraduate training classes, Likert scale responses were collapsed into 3 categories: agree (5 or 4), neutral (3), and disagree (2 or 1). Comparisons between classes were assessed using a Chi-Squared test with significance of P value $\leq .05$ and bar plots were used to display the distribution of survey responses. SAS 9.4 (Cary, NC) and the R package Likert (R version 3.6.0, The R Foundation for Statistical Computing) were used for these analyses.

3. Results

Forty four anesthesiology residents between the 3 resident classes completed the survey. Of the 44 participants that completed the survey, 17 were PGY-2, 13 were PGY-3, and 14 were PGY-4. Unsurprisingly, since only the PGY-3 residents had previously participated in the simulated training exercise with the SPA, second and fourth year residents (6% and 14%, respectively) were much less likely compared to third year residents (62%) to respond that they had received prior training on the topic ($P = .003$) (Fig. 2). A higher proportion of PGY-4 residents (86%) compare to PGY-2 (65%) and PGY-3 (69%) residents acknowledged a lack of cohesive coordination and communication between medical services when caring for patients with a DNR order in place ($P = .02$) (Fig. 2). Similarly residents from all 3 classes responded similarly that they disagreed that only surgical team members as opposed to anesthesia team members should discuss perioperative code status with patients prior to undergoing surgical procedures (Fig. 2).

Survey questions that assessed familiarity with the ASA guidelines on the process of required reconsideration for patients with DNR orders demonstrated that PGY-2 and PGY-3 residents, who completed the simulation training, mostly outperformed more senior PGY-4 trainees. PGY-2 (47%) and PGY-3 (62%) residents were more likely to correctly acknowledge the presence of ASA guidelines on the issue compared to PGY-4 residents (21%) ($P = .004$) (Fig. 3). Likewise on topics addressed within the ASA guidelines, PGY-2 and PGY-3 residents were more likely, compared to PGY-4, to correctly acknowledge patient's self-autonomy in limiting medical interventions by refusing intubation (47%, 85% vs 14%, $P = .004$) and the ability to designate a medical professional to represent their wishes during a surgical procedure (53%, 62% vs 21%, $P = .05$) (Fig. 3). There were no differences between responses of all 3 training classes in recognizing the potential appropriateness of reinstating a patient's DNR during the course of a surgical procedure.

Third year residents that had previously undergone the simulation training and had completed a year of clinical anesthesia residency outperformed PGY-2 and PGY-4 residents in stating that they were aware of the institutional policies on matters related to perioperative DNR (69% vs 0%, 14%; $P < .001$) and were more likely to acknowledge that automatic suspension of DNR is not part of hospital policy (85% vs 71%, 43%; $P = .02$) (Fig. 4). A higher proportion of PGY-3 residents reported awareness of proper documentation of DNR in the electronic medical record compared to PGY-2 and PGY-4 residents (62% vs 6%, 21%; $P = .006$) (Fig. 4).

There was no significant difference detected between resident classes in correctly identifying the improved survival of intraoperative cardiac arrest as compared to other in-hospital arrests. Similarly, no difference was noted between resident classes in their

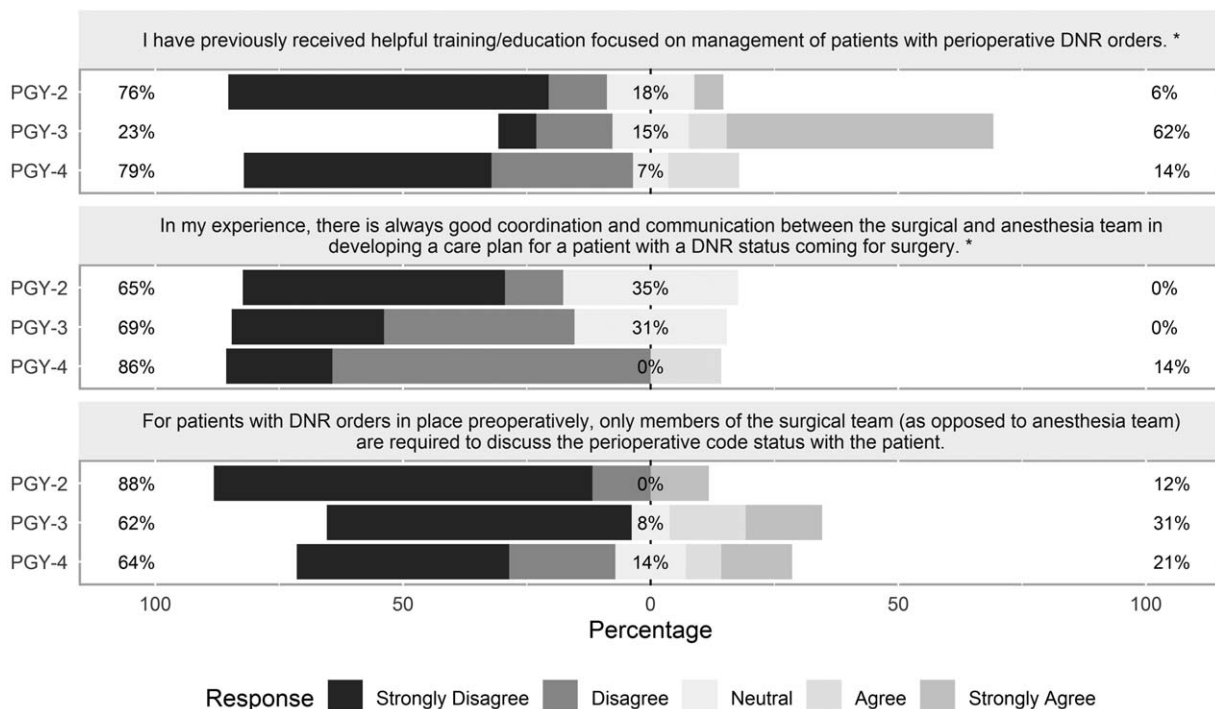


Figure 2. Trainee responses to survey questions focused on eliciting prior clinical or educational experiences caring for patients with DNR orders. Statistically significant comparisons are designated with an asterisk (*). PGY = post graduate year.

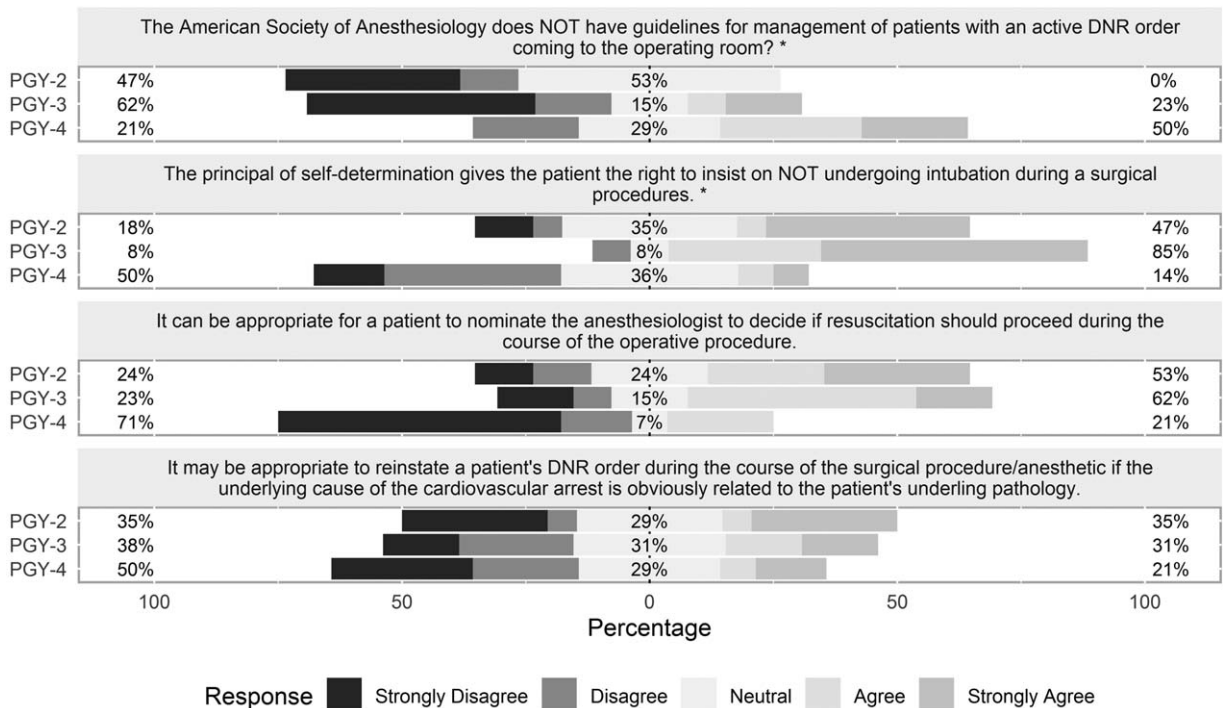


Figure 3. Trainee responses to survey questions on American Society of Anesthesiology guidelines on caring for patients with DNR orders. Statistically significant comparisons are designated with an asterisk (*). PGY = post graduate year.

ability to correctly disagree that the percentage of patients that come to the preoperative area with DNR orders in place is less than 5% (PGY-2 18%, PGY-3 54%, PGY-4 50%; $P=.14$) (Table 1).

4. Discussion

Perioperative anesthetic medications render patients unable to make decisions in directing their own medical care during and immediately following surgical interventions. Patients with

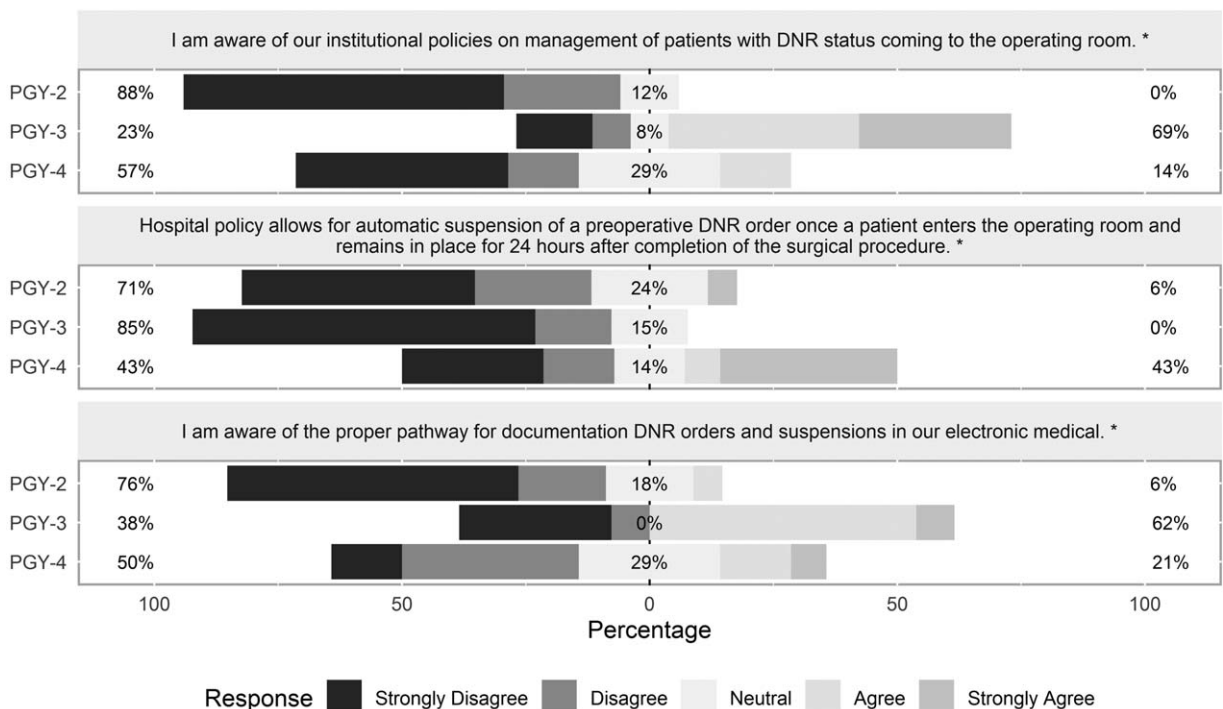


Figure 4. Trainee responses to survey questions on hospital policies and procedures when caring for patients with DNR orders. Statistically significant comparisons are designated with an asterisk (*). PGY = post graduate year.

advanced directives and DNR orders must be allowed to maintain their self-autonomy during the perioperative period by respecting those predetermined decisions, when they have a temporary loss of capacity for active decision making. Medical providers that misrepresent patients' options or neglect to follow the process of required reconsideration pose a serious ethical dilemma that can substantially alter the last days of patients' lives. Educational training for surgical and anesthesiology trainees must address this known gap in current practice patterns. This study utilized a standardized patient encounter simulation followed by debriefing within the first month of anesthesiology residency training that appeared to have long lasting benefits in trainees' knowledge of ASA guidelines as well hospital policies in relation to operative care of patients with DNR orders.

Unfortunately, both surgeons and anesthesiologists at all training levels frequently do not comply with the stated guidelines. A simulation study at a major academic medical center of practicing anesthesiologist asked to evaluate a patient actor with metastatic cancer with a DNR order undergoing central line placement demonstrated frequent omission of the patient's DNR during the preoperative assessment and found no correlation between intraoperative management of simulated cardiopulmonary arrest and the preoperative code status conversation.^[16] Despite ASA and ACS consensus statements describing the inappropriateness of automatic suspension of DNR orders, large numbers of anesthesiologist and surgeons report a frequent practice of automatic suspension.^[9,10,17] Regrettably, the lack of compliance with professional guideline statements is common in modern medicine.^[18] For these reasons we attempted to focus on knowledge of professional guidelines within our study. Certainly effective perioperative DNR discussions go well beyond simply knowledge of professional guidelines and require significant communication training.^[19]

Our survey demonstrates that PGY-3 trainees overall performed superiorly to their more experienced PGY-4 counterparts in knowledge of professional guidelines and hospital policies (Figs. 3 and 4). Of note, PGY-3 resident had completed their SPA encounter and debrief approximately 1 year prior to their assessment, thus demonstrating retention of the knowledge that they had gained. This finding highlights that in this specific question, educational exposure followed by clinical application in the perioperative environment may lead to the largest gains. While senior residents (PGY-4) could claim the largest scope of clinical experience, they often times were outperformed by anesthesiology residents that were just starting their clinical anesthesia experience. One notable example was in the question of whether a hospital policy allows for automatic suspension of DNR for operative patients. PGY-4 residents were significantly more likely, when compared to PGY-2s, to believe that there is a policy allowing for automatic suspension (43% vs 71%) (Fig. 4). This finding is consistent with prior research, as this incorrect perception of automatic suspension of DNR for operative patients is pervasive in assessments of surgeons and anesthesiologists.^[1,16,17] This deficit in knowledge by senior trainees is notable considering previous scientific literature has demonstrated progression through residency has an expected positive effect on clinical care and on performance in the simulation lab.^[20-22] Certainly the uniqueness of the perioperative environment may promote a dogma that prioritizes survivability of an operation over honoring individual patients' wishes to maintain their self-autonomy.

While participation in the educational session appeared to play a greater role, compared to seniority, in molding some decision

making for DNR patients, other responses appeared to go along with the level of training. Seniority in the training program appeared to trend with more accurate approximations of the proportion of patients that may be seeking a surgical intervention that have a DNR order and the survivability of intraoperative arrests, but did not reach statistical significance (Table 1). This is certainly not surprising considering that the training did not focus on these statistical realities, and instead centered on knowledge of professional guidelines and hospital policies, and therefore likely reflects PGY- 3 and 4 expanding clinical experience, compared to junior residents.

A majority of residents from all classes appeared to note a lack of consistent coordination and forward planning for perioperative patient's with DNR orders as prescribed by the process of required reconsideration (Fig. 2). Additionally, PGY-3 residents were much more likely compared to their senior co-residents to report that they had received previous training on the topic, likely in the form of the simulated experience approximately 1 year prior to completing the survey (Fig. 2). This lack of training had been corroborated by several single institution investigations that highlight the lack of training of surgeons and anesthesiologists in matters relating to advanced directives and perioperative code status.^[3,16] Inadequate code status discussions, frequently performed by junior team members, appear to be more pervasive in the perioperative sphere compared to other hospitalizations.^[23] While considering the limitations in effective code status discussions, it is important to note that code status decisions appear to play a significant role in perioperative morbidity and mortality, with a DNR status being associated with worse outcomes.^[24] Shifting the setting of perioperative code conversations to anesthesiologists led perioperative surgical home has been proposed as a possible remedy for this clinical dilemma.^[4,25] This change would potentially allow for an improvement in care coordination by involvement of medical personnel with previously established relationships, decreased time pressures, and a greater chance for nuance, such as specific exceptions to a standing DNR order. While anesthesiologist may be uniquely positioned to advocate for patient autonomy, significant cultural change requires training and curriculum development aimed at improving communication skills, a focus of the ACGME. We demonstrate a clear benefit and relatively long standing retention of expertise gained by participating in this educational session and aim to add to a growing body of literature suggesting a need for additional curriculum to further these goals.

Study limitations include the single center-design, relatively small size, and reliance on survey results from trainees following scripted encounters with a SPA. An element of simulation artifact is unavoidable in attempting to predict clinical behavior based on standardized patient interaction. On the other hand, simulated conversations with a SPA do not require advanced technology, expansive simulation labs, or trained simulationists. While the debriefing sessions were standardized by topics and performed by the same 2 attending anesthesiologists experienced in simulation education, each individual debrief session will vary and potentially impact the long term lessons learned by trainees. Attempting to further standardize the educational training and provide formal teacher training may create a greater long-term educational impact.

We did not collect additional demographic data like age, gender, or previous training in communication skills. While this information would be of value in identifying further confounding variables, we limited collection of this information to ensure anonymity of

survey responders. Our study did not attempt to identify the optimal educational design for improving trainee performance; instead, we suggest 1 model for addressing the educational gap regarding this important topic. Certainly the brief nature of this didactic session can only provide a superficial overview on the topic. Of note, 1 survey question that posed a challenging clinical scenario inquiring on the appropriateness of reinstating a patient's DNR order during the course of a surgical procedure did not differ amongst classes with an even distribution across responses of agree, neutral, and disagree (Fig. 3). This uncertainty by resident participants highlights the limitations of a short one-hour training session in delving into complex issues of self-determination and autonomy. This is supported by publications on the topic that highlight the challenges that these situations may pose on perioperative medical professionals.^[16,25] Additional longitudinal training in the clinical and didactic realm would likely show improved retention and further gains in discussing patient's autonomy.^[26,27]

5. Conclusion

As the role of anesthesiologists expands past the operating room, new curriculum must be developed to improve perioperative code status discussions. Our findings are notable in demonstrating that seniority in the residency program and the growing depth of clinical experiences did not appear to be the principal predictor in understanding these concepts of patient autonomy. Conversely, participation in the training session demonstrated improved performance by junior trainees as well as retention 1 year following training. These findings highlight the need for further educational research on ethics and communication. Low fidelity simulation, similar to the one described above, allows a deeper examination of real-life situations where hospital policies and professional guidelines may be inappropriately applied.

Author contributions

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